

CLAIMS

1. A media streaming delivery system, comprising:
a media delivery apparatus for transmitting a media stream
5 in packets to a network according to a real time transfer protocol;
a relay apparatus connected to said network for transmitting
said media stream to a communication link with a large delay; and
packet analysis means for monitoring said packet arriving at
said relay apparatus and transmitting feedback information
10 indicating a status of said network to said media delivery apparatus.
2. The delivery system according to claim 1, wherein said feedback
information is a acknowledge response sent to said relay apparatus
each time a packet of said media stream arrives.
3. The delivery system according to claim 1, wherein said feedback
15 information is a sequence number of a packet lost from said media
stream.
4. The delivery system according to claim 2 or 3, wherein said
media delivery apparatus is arranged to modify said media stream
based on said feedback information.
- 20 5. The delivery system according to claim 4, wherein said
communication link with a large delay is a wireless link.
6. The system according to claim 4,
wherein said media stream is a video including a sequence of
I-pictures and P-pictures; and

wherein said media delivery apparatus comprises:

a storage for storing a plurality of media streams for one video, including at least a first media stream containing I-pictures in a first arrangement and a second media stream containing I-pictures
5 in a second arrangement which is different from said first arrangement; and

switching means for, in response to determination of said packet loss, for the destination for which said loss has occurred, selecting a media stream in which a first I-picture after the picture
10 in said lost packet appears earliest among said plurality of media streams, and switching the media stream to be sent to said selected media stream.

7. The system according to claim 6,

wherein said media stream is a video including a sequence of
15 I-pictures and P-pictures;

wherein said media delivery apparatus comprises an encoding device for generating said media stream; and

wherein said encoding device is arranged to generate a media stream starting with an I-picture in response to determination of
20 said packet loss.

8. A packet analysis apparatus, comprising:

detecting means connected to a network for receiving a packet transmitted in said network and detecting a media stream; and

packet analysis means for detecting loss of a packet in said

detected media stream and performing feedback to a source of said media stream.

9. A network relay apparatus comprising the packet analysis apparatus according to claim 8,

5 wherein said network relay apparatus sends to said source identification information of a packet received from said network and sent to a communication link different from said network.

10. The relay apparatus according to claim 9, wherein detection of said packet loss is performed based on sequence numbers included
10 in headers of a sequence of packets constituting said media stream.

11. A media delivery apparatus used for delivering a media stream comprising a sequence of packets,

 wherein said apparatus is arranged for, in response to feedback relating to packet loss on a delivery path of said media stream,
15 modifying said media stream so as to reduce an influence of said loss.

12. The media delivery apparatus according to claim 11,

 wherein said media stream is a video including a sequence of I-pictures and P-pictures;

20 wherein said media delivery apparatus comprises an encoding device for generating said media stream; and

 wherein said encoding device is arranged to generate a media stream starting with an I-picture in response to determination of said packet loss.

13. The media delivery apparatus according to claim 12, wherein said feedback relating to said packet loss is feedback relating to said packet loss observed at a point where said delivery path switches from a link with a small delay to a link with a large delay.

5 14. The media delivery apparatus according to claim 13, wherein said link with a small delay is a wired link and said link with a large delay is a wireless link.

15. The media delivery apparatus according to claim 11 wherein said media stream is a video including a sequence of I-pictures
10 and P-pictures, said media delivery apparatus comprising:

a storage for storing a plurality of media streams for one video, said plurality of media streams including at least a first media stream including I-pictures in a first arrangement, and a second media stream including I-pictures in a second arrangement
15 which is different from said first arrangement; and

switching means for, in response to determination of said packet loss, for a destination in which said loss has occurred, selecting a media stream in which a first I-picture appears earliest after said lost packet among said plurality of media streams and
20 switching the media stream to be sent to said selected media stream.

16. The media delivery apparatus according to claim 15, wherein said encoding device is arranged such that, in response to detection of a packet loss based on feedback information from said packet analysis apparatus, said encoding device increases a frequency of

I-pictures at least for a media stream transmitted to a destination for which said loss has occurred.

17. The media delivery apparatus according to claim 15, wherein said encoding device is arranged such that, in response to detection of said packet loss based on feedback information from said packet analysis apparatus, said encoding device transmits a media stream starting with an I-picture to the destination for which said loss has occurred.

18. The media delivery apparatus according to claim 14, wherein said media delivery apparatus performs said retransmission of a packet based on said feedback information relating to a packet loss.

19. A relay apparatus for connecting a communication link with a small delay and a communication link with a large delay, comprising:
a first feedback device for receiving a packet of a media stream transmitted on said link with a small delay, and transmitting information including a packet loss rate over a predetermined period to a transmission source;

adjusting means for adjusting passage of packets received from said network according to transmission capability of said communication link with a large delay; and

a second feedback device for transmitting to said transmission source a acknowledge response about a packet transmitted through said adjusting means to said communication link.

20. The relay apparatus according to claim 19, wherein said second

feedback device transmits to said transmission source a sequence number included in a header of said packet transmitted through said adjusting means to said communication link with a large delay.

21. A media stream delivery system, comprising:

5 a media delivery apparatus for transmitting a media stream in packets to a network by using a real time transfer protocol; and

a relay apparatus connected to said network for transmitting said media stream to a communication link with a large delay, said
10 relay apparatus comprising:

a first feedback device for receiving a packet of said media stream transmitted in said network and transmitting information including a packet loss rate over a predetermined period to a transmission source; adjusting means for adjusting passage of
15 packets received from said network according to a transmission capability of said communication link with a large delay; and a second feedback device for transmitting to said transmission source a acknowledge response about a packet transmitted through said adjusting means to said communication link.

20 22. The media stream delivery system according to claim 21, wherein said communication link with a large delay is a wireless link, and wherein said system is arranged such that, if a receiving buffer of a wireless terminal is large, retransmission is performed based on a acknowledge response from said wireless terminal.

23. The delivery system according to claim 21, wherein said communication link with a large delay is a wireless link, and wherein said system is arranged such that, if a receiving buffer of a wireless terminal is not large enough to accommodate retransmission from
5 said media delivery apparatus, said relay apparatus transmits said media stream with an error correction code added.

24. The delivery system according to claim 21, wherein said communication link with a large delay is a wireless link, and wherein said system is arranged such that, if a receiving buffer of a wireless
10 terminal is small, said media delivery apparatus adds an error correction code to a media stream transmission on said communication link with a small delay.